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PUBLIC EMPLOYEES' RETIREMENT SYSTEM

STATE OF MONTANA

ACTUARIAL VALUATION

AS OF JULY 1, 1994

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ACTUARIAL CONSULTANTS

Public Employees' Retirement System

State of Montana

Actuarial Valuation

As of July 1, 1994

Public Employees' Retirement System

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Public Employees' Retirement System

Section I

Introduction

An actuarial valuation of the Public Employees' Retirement System of the State of Montana has been completed as of July 1, 1994. This valuation was authorized by the Public Employees' Retirement Board under Section 19-2-405, MCA. The purpose of the valuation was to determine the financial position of the fund, the normal cost, and the unfunded accrued liability based upon present and prospective assets and liabilities of the system as of July 1, 1994.

Section II presents an analysis of the results of the actuarial valuation. The numerical findings and membership data supporting this analysis are shown in Section III.

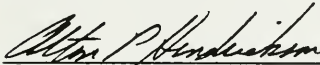
In conducting the actuarial valuation, certain assumptions were made as to the future experience of the system. A summary and discussion of each of the assumptions is contained in Section IV.

The valuation is based upon the Public Employees' Retirement Act and incorporates all amendments as of July 1, 1994. A summary of the major provisions of the Act is contained in Section V.

Actuarial Certification

The results of the actuarial valuation shown in this report are based upon information provided by the Public Employees' Retirement Division regarding plan participants, plan assets and other matters as of June 30, 1994. The values have been calculated on the basis of actuarial assumptions which, in my opinion, are appropriate for purposes of this valuation.

This valuation has been prepared in accordance with generally accepted actuarial principles and practices and, to the best of my knowledge, fairly reflects the actuarial position of the Public Employees' Retirement System as of July 1, 1994.



Alton P. Hendrickson
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Public Employees' Retirement System

Section II

Analysis of Valuation

Results of Valuation

An actuarial valuation has been conducted for the Public Employees' Retirement System as of July 1, 1994. This valuation has determined that the percent of each member's compensation required to fund the benefits as they accrue in the future is 10.21%. The regular contribution rate of 13.40% allows 3.19% to be applied to the unfunded past service liability. This percent is sufficient to amortize the unfunded past service liability over a period of 16.12 years. This period has decreased from 18.25 years in 1992.

Asset Valuation

For purposes of the actuarial valuation, the system's assets are valued at market value, with gain and loss fluctuations smoothed over a 4-year period. The table below illustrates this valuation procedure:

	<u>Actual</u>		<u>Adjusted</u>
Cost Value as of 6/30/94	1,202,063,252		1,202,063,252
1994 Market Gain	(63,513,399)	x .25	(15,878,350)
1993 Market Gain	33,988,867	x .50	16,994,434
1992 Market Gain	62,193,025	x .75	46,644,769
Prior Market Gain	117,039,950	x 1.00	117,039,950
	-----		-----
Market Value as of 06/30/94	1,351,771,695		1,366,864,055

Investment Performance

The adjusted value basis produced an investment return of 7.72% during the 1993-94 fiscal year. The rate of investment return was 1.75% on a market value basis and 7.79% on a cost value basis. These rates were based on all assets of the system including accruals, and assumed uniform fund activity throughout the year.

Because the cost value investment rate of 7.79% is less than 8%, no post-retirement benefit adjustment will be allocated on January 1, 1995.

Amortization of Unfunded Liability

The Public Employees' Retirement Board has set a goal of funding liabilities over a period not to exceed 30 years. The schedule in this report illustrates the rate required to fund each valuation's new liabilities over a 30-year period.

The amortization period of past liabilities decreases 2 years with each valuation. The schedule began with an initial liability established on July 1, 1984.

Actuarial Assumptions

An experience study was completed in 1994 to investigate the actuarial experience of the Public Employees' Retirement System of the State of Montana. A review of the system's data and experience revealed a need for changes to be made to the following assumptions: mortality, withdrawal, disability, salary increase and service purchase assumptions. The remaining actuarial assumptions did not warrant a change from those used in the valuation of July 1, 1992. The assumption changes are described further in the Discussion of Actuarial Assumptions.

The overall effect of the revised assumptions was an increase in the funding period of .16 years from 15.96 to 16.12. Had the additional cost not been absorbed in the funding period, the annual required contribution would have increased .02% of compensation.

Retirement Incentive Program

The Retirement Incentive Program provided a window of opportunity for eligible members to receive additional service credits at no cost. Members who were eligible for early or normal retirement and who could purchase 1 additional year of credit for each 5 years of employment were granted up to 3 years of such service at no cost provided they retire between June 25, 1993 and December 31, 1993.

A total of 885 qualifying members received additional service credit under this program. An aggregate of 2,445 years of service were credited for an average of 2.76 years to each qualifying member. The additional annual benefits were \$1,480,595 which increased the average monthly benefit from \$927 to \$1,066.

The cost to provide these additional benefits was \$16,372,415. The state contributed \$9,414,661 which represented 13.4% of compensation for each year of service granted to each member. The unfunded cost absorbed by the retirement system was \$6,957,754. This underfunding increased the funding period of the system by .47 years. If the underfunding were to be funded through contribution increases over the next 30 years, the amount of the increase would be .05% of each active member's compensation.

The total number of retirements during 1993-94 was 1,150. The average had been 550 per year. In 1992-93 it dropped to 482, possibly in anticipation of the incentive program. It appears that approximately 600 members took advantage of the program. It is reasonable to anticipate a decline in the average number of retirees in the next few years.



Summary of Data

The active membership was 27,044 on June 30, 1994 compare to 27,473 on June 30, 1992. The annual payroll increased from \$548.2 to \$573.0 million during the biennium. The average pay per member grew at the rate of 6.2% per year.

The average active member is 43.5 years of age, was employed at age 35.8, has completed 7.7 years of service, and earns \$21,186.

The number of members receiving benefits was 11,961 on June 30, 1994 compared to 10,734 on June 30, 1992. The annual benefit payout increased from \$58.2 to \$76.6 million during the biennium.

The average retiree is 70.8 years of age, retired at age 61.0 with 19.0 years of service, and receives a benefit of \$542 per month. The average pay per retired member grew at the rate of 9.02% per year.

Conclusion

Because of increased payroll and benefit payouts, the system's total liability grew by 11.8%. This was offset by a 20.6% growth in assets. The member's contribution was 6.7% of compensation and the employer's was 6.7%. This funding level allows the system's unfunded liability to be funded over 16.12 years compared to 18.25 years in 1992.

Based on the results of this valuation, the Public Employees' Retirement System is actuarially sound.

Public Employees' Retirement System

Section III

Schedule 1

Normal Cost Allocation

(1) Normal Cost Contribution Rate:

(a) Retirement	7.13%
(b) Death	0.21
(c) Disability	0.39
(d) Vested	2.08
(e) Withdrawals	0.40

(f) Total Rate	10.21%

(2) Present Value of Future Salaries Of Current Members	\$4,062,649,029
(3) Present Value of Future Normal Costs For Current Members (1(f) * (2))	\$ 414,796,466

Public Employees' Retirement System

Schedule 2

Present Value of Benefits

(1) Present Value of Benefits - Inactive Members

(a) Retirement	\$ 649,216,348
(b) Death	15,159,479
(c) Disability	41,388,382
(d) Vested	31,805,950
(e) Withdrawals	5,981,335
(f) Benefit Adjustment	0

(g) Total Inactive	\$ 743,551,494

(2) Present Value of Benefits - Active Members

(a) Retirement	\$ 996,519,386
(b) Death	20,438,069
(c) Disability	35,769,047
(d) Vested	198,308,182
(e) Withdrawals	45,930,493

(f) Total Active	\$1,296,965,177

(3) Total Liabilities \$2,040,516,671

Public Employees' Retirement System

Schedule 3

Liability Allocation and Statutory Funding

(1) Unfunded Past Service Liability

(a) Present Value of Benefits	\$2,040,516,671
(b) Present Value of Future Normal Costs	\$ 414,796,466
(c) Fund Assets	\$1,366,864,055 -----
(d) Unfunded Liability (a)-(b)-(c)	\$ 258,856,150

(2) Contribution Rates Amortized over 16.12 Years

(a) Present Value of Salaries During Next 16.12 Years	\$ 8,114,612,041
(b) Unfunded Contribution Rate $1(d)/2(a)$	3.19%
(c) Normal Cost Rate (Schedule 1)	10.21 -----
(d) Statutory Funding Rate	13.40%

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OF THE EIGHTEENTH VOLUME

Public Employees' Retirement System

Schedule 4

Unfunded Liability Amortization Schedule

(1) Biennial Unfunded Past Service Liability Accounts

Year	Liability Account On 7/1/92	Interest Charged To Acc't	Contribution Credited To Acc't	Interest Credited To Contrb	Liability Account On 7/1/94
1984	354,986,536	59,069,758	64,336,643	4,979,514	344,740,137
1986	-35,587,098	-5,921,693	-6,449,694	-499,192	-34,559,905
1988	6,813,193	1,133,715	1,234,802	95,571	6,616,535
1990	-35,875,482	-5,969,680	-6,501,959	-503,237	-34,839,966
1992	-13,240,627	-2,203,240	-2,399,690	-185,731	-12,858,446

(2) Actuarial Gain/Loss

Current Unfunded Liability (Schedule 3)	\$ 258,856,150
Less 1984 Liability Account	344,740,137
Less 1986 Liability Account	-34,559,905
Less 1988 Liability Account	6,616,535
Less 1990 Liability Account	-34,839,966
Less 1992 Liability Account	-12,858,446
1994 Liability Account as of 7/1/94	\$ -10,242,205

(3) Required Contribution Rate

Normal Cost Rate (Schedule 1)	10.21%
Rate to Fund 1984 Liability Over 20 Years	3.53
Rate to Fund 1986 Liability Over 22 Years	-0.33
Rate to Fund 1988 Liability Over 24 Years	0.06
Rate to Fund 1990 Liability Over 26 Years	-0.29
Rate to Fund 1992 Liability Over 28 Years	-0.10
Rate to Fund 1994 Liability Over 30 Years	-0.28
Contribution Rate for 30-Year Schedule	12.80%

Public Employees' Retirement System

Schedule 5

Table 1

Comparison of Valuations

	<u>1992</u>	<u>1994</u>
(1) Unfunded Past Service Liability		
(a) Present Value of Benefits	\$1,824,774,126	\$2,040,516,671
(b) Present Value of Future Costs	\$ 414,475,945	\$ 414,796,466
(c) Fund Assets	\$1,133,201,659	\$1,366,864,055
(d) Unfunded Liability	\$ 277,096,522	\$ 258,856,150
(2) Amortization Period and Contribution Rates		
(a) Years for Amortization	18.25	16.12
(b) Unfunded Contribution Rate	3.14%	3.19%
(c) Normal Cost Rate	10.24%	10.21%
(d) Statutory Funding Rate	13.38%	13.40%
(3) Active Members		
(a) Number of Members	27,473	27,044
(b) Annual Payroll	\$548,152,580	\$572,973,634
(c) Average Annual Salary	\$ 19,952	\$ 21,186
(4) Inactive Members		
(a) Number of Retired	9,681	10,853
(b) Number of Disabled	831	867
(c) Number of Survivors	222	241
(d) Number of Vested Deferred	1,034	1,173
(e) Annual Benefits	\$ 58,182,895	\$ 76,559,478
(f) Average Monthly Benefit	\$ 452	\$ 533

Public Employees' Retirement System

Schedule 6

Table 1

Number of Active Members

Years of Service	Member's Age									Total
	20-25	25-29	30-34	35-39	40-44	45-49	50-54	55-59	OVER 60	
0-4	717	1483	2043	2434	2319	1652	1106	648	421	12823
5-9	6	235	756	1071	1259	1013	732	444	366	5882
10-14		9	286	678	819	745	572	468	291	3868
15-19			24	364	713	589	427	347	207	2671
20-24				21	252	456	275	207	114	1325
25-29					7	82	114	89	56	348
30-34						3	35	31	20	89
35-39							2	15	13	30
40-UP								1	7	8
Total	723	1727	3109	4568	5369	4540	3263	2250	1495	27044

Public Employees' Retirement System

Table 2

Average Salaries of Active Members

Years of Service	Member's Age									
	20-25	25-29	30-34	35-39	40-44	45-49	50-54	55-59	OVER 60	Total
0-4	15715	18265	18700	18528	18454	18780	17942	17889	16375	18233
5-9	22260	20702	22617	22589	21820	21433	19675	19603	17598	21255
10-14		23008	23173	25173	25318	23873	21639	20762	19828	23342
15-19			23670	26749	28477	28593	24782	22837	20898	26313
20-24				26830	30055	31779	29520	25642	25011	29363
25-29					32115	33007	32359	28516	26269	30549
30-34						34879	32960	32226	26062	31219
35-39							40764	29554	32953	31775
40-UP								46473	33743	35334
Total	15769	18621	20102	21160	22184	23054	21532	21010	19357	21186

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Public Employees' Retirement System

Table 3

Number of Vested Inactive Members

Years of Service	Member's Age									Total
	20-25	25-29	30-34	35-39	40-44	45-49	50-54	55-59	Over 60	
0-4										
5-9		11	69	121	139	157	133	82	47	759
10-14			8	29	63	75	55	29	19	278
15-19			1	2	22	33	25	14	8	105
20-24					2	10	5	7	4	28
25-29								2		2
30-34				1						1
35-39										
40-UP										
Total		11	78	153	226	275	218	134	78	1173

Public Employees' Retirement System

Table 4

Number of Retired Members

Member's Service	Recipient's Age									Total
	< 45	45-49	50-54	55-59	60-64	65-69	70-74	75-79	Over 80	
0-4			1	1		13	15	26	27	83
5-9	1		35	101	218	375	443	384	238	1795
10-14	1		31	104	277	480	513	467	536	2409
15-19	2		32	77	282	473	437	355	373	2031
20-24	7		22	62	208	358	323	270	274	1524
25-29	3	2	58	80	197	236	184	151	149	1060
30-34	1	51	160	232	259	225	207	127	129	1391
35-39	3		26	55	73	66	70	59	84	436
40-UP	1		1	22	13	17	22	20	28	124
Total	19	53	366	734	1527	2243	2214	1859	1838	10853

Public Employees' Retirement System

Table 5

Average Benefits of Retired Members

Member's Service	Recipient's Age									Total
	< 45	45-49	50-54	55-59	60-64	65-69	70-74	75-79	Over 80	
0-4			125	118		115	92	80	78	88
5-9	97		112	147	168	167	167	156	155	161
10-14	232		212	220	279	300	290	269	247	273
15-19	358		349	342	455	474	430	384	350	416
20-24	383		471	605	682	660	611	515	450	583
25-29	426	1020	1013	941	935	877	790	664	565	810
30-34	922	1521	1471	1342	1232	1076	960	830	668	1133
35-39	521		1756	1800	1516	1480	1271	1034	816	1314
40-UP	751		1877	2027	2022	1743	1532	1417	945	1545
Total	434	1502	1021	861	671	555	486	408	376	542

Public Employees' Retirement System

Table 6

Number of Disabled Members

Member's Service	Recipient's Age									Total
	< 45	45-49	50-54	55-59	60-64	65-69	70-74	75-79	Over 80	
0-4	1	3	3	5	2	4	8	11	11	48
5-9	41	19	34	53	53	37	44	11	27	319
10-14	13	11	20	31	42	41	22	23	25	228
15-19	9	8	10	22	36	16	19	11	11	142
20-24	1	3	15	15	17	15	7	9	7	89
25-29		1	1	5	5	12	5	3	1	33
30-34			1		1	1			3	6
35-39									2	2
40-UP										
Total	65	45	84	131	156	126	105	68	87	867

Public Employees' Retirement System

Table 7

Average Benefits of Disabled Members

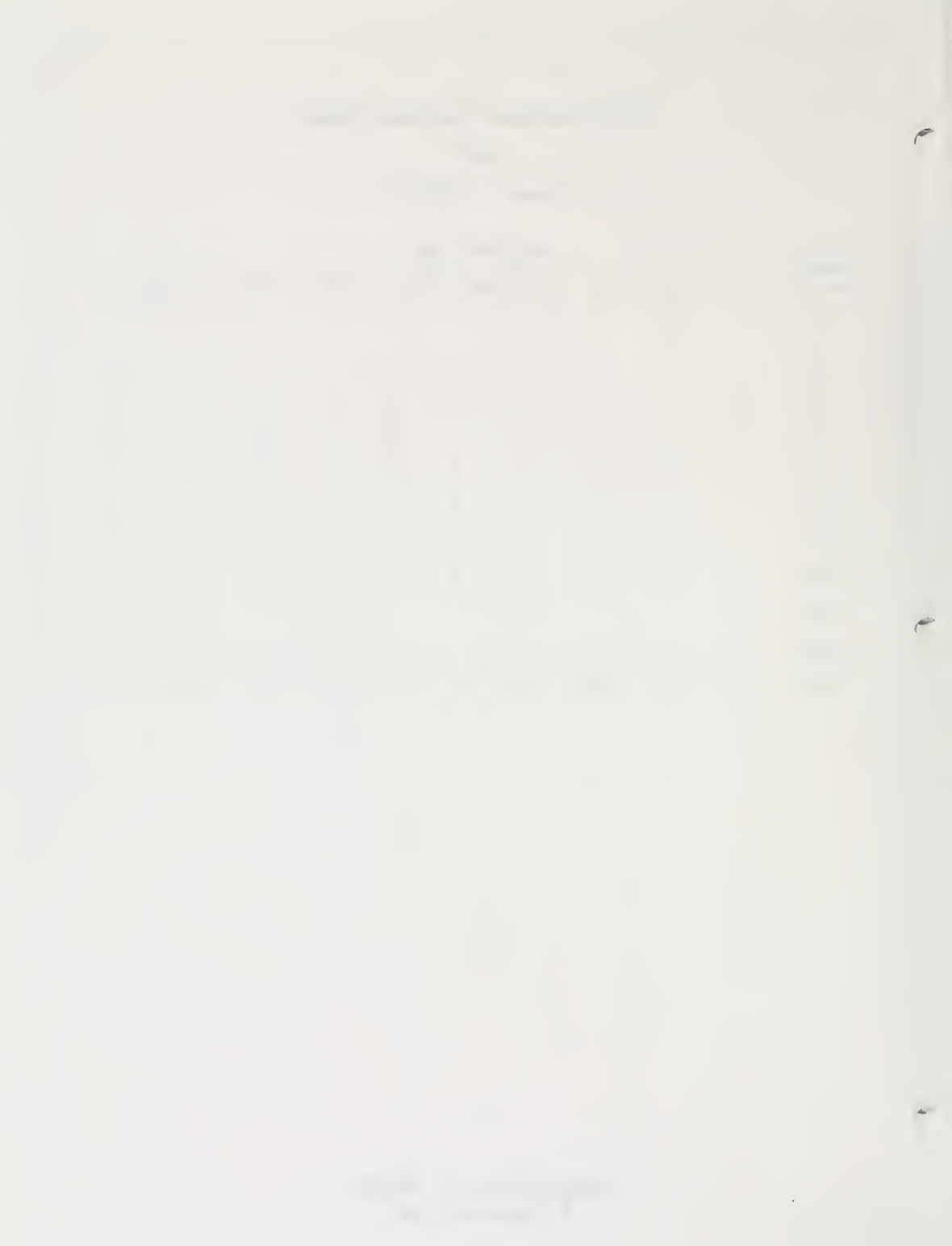
Member's Service	Recipient's Age									Total
	< 45	45-49	50-54	55-59	60-64	65-69	70-74	75-79	Over 80	
0-4	468	355	415	407	342	481	374	334	362	376
5-9	369	352	344	325	344	377	349	344	315	347
10-14	392	444	392	396	329	362	343	423	360	373
15-19	487	512	390	417	432	437	417	463	470	439
20-24	658	652	711	663	564	535	483	600	483	595
25-29		644	732	843	820	695	507	480	437	680
30-34			372		1229	822			572	690
35-39									555	555
40-UP										
Total	396	430	434	419	405	436	378	428	383	411

Public Employees' Retirement System

Table 8

Number of Survivors

Member's Service	Recipient's Age									Total
	< 45	45-49	50-54	55-59	60-64	65-69	70-74	75-79	Over 80	
0-4										
5-9	2			3	3	4	3	2		17
10-14	2	2		2	5	10	12	8	9	50
15-19	2	1	3	4	6	10	5	5	15	51
20-24			2	2	8	8	5	5	12	42
25-29		1	3	3	4	3	7	5	13	39
30-34			2	4	4	5	5		3	23
35-39				1	1	1	2		6	11
40-UP	1				1	2	1		3	8
Total	7	4	10	19	32	43	40	25	61	241



Public Employees' Retirement System

Table 9

Average Benefits of Survivors

Member's Service	Recipient's Age									Total
	< 45	45-49	50-54	55-59	60-64	65-69	70-74	75-79	Over 80	
0-4										
5-9	173			178	217	251	181	294		216
10-14	306	275		292	367	226	341	254	319	297
15-19	276	510	309	471	523	526	425	474	373	438
20-24			601	266	456	635	554	414	484	502
25-29		1236	954	822	1282	579	609	573	511	697
30-34			1758	1348	1333	1199	963		656	1174
35-39				2255	1180	2438	1538		733	1213
40-UP	722				1683	772	1708		784	1001
Total	319	574	851	718	706	589	585	397	486	571

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Public Employees' Retirement System

Section IV

Actuarial Funding Method

The cost of the retirement system will be determined by its future experience. In calculating the financial requirements of the fund, certain assumptions were made as to the expected future experience. This section summarizes the funding method applied as well as the actuarial assumptions used.

Any variations in the actual experience of the fund from those assumed in this valuation may cause changes in the projected futures costs of the fund. It is therefore necessary that the actuarial assumptions be reviewed from time to time with adjustments as experience warrants. It is also important that regular valuations be performed to determine the financial effect of variations between the actual and assumed experience.

The assumptions used in the valuation are based upon the past experience of the fund together with projections as to future experience.

The method of funding employed is commonly referred to as the entry age normal cost method. This method establishes a normal cost as well as an unfunded accrued liability. The normal cost is the level percentage of total salaries required to fund the benefits, assuming this percentage has been contributed since each member's entry into the fund.

The unfunded accrued liability represents the excess of the present value of total liabilities over the present value of the fund assets and the present value of expected future contributions at the normal cost rate.

In order to maintain the fund on an actuarially sound basis, the rate of contribution should be such as to provide for the normal cost in addition to making progress towards the amortization of the unfunded liability.

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Public Employees' Retirement System

Discussion of Actuarial Assumptions

Mortality Rates

The mortality rates for males and females are based upon the 1983 Group Annuity Mortality Table, set back 1 year for active members and 2 years for those receiving benefits. The July 1, 1992 actuarial valuation used the 1983 GAM Table with no setbacks.

Disability Rates

The disability rates for males and females are based upon the 1983 Disability Table.

Withdrawal Rates

The withdrawal rates are based upon the actual experience of the system as determined in the 1994 withdrawal study.

Salary Scale

The rates of salary increase are based upon an assumed compounded growth rate of 6.25% per annum. The July 1, 1992 actuarial valuation used a 6.5% salary scale.

Investment Earnings

It was assumed that the investment earnings would be 8% compounded annually.

Asset Valuation

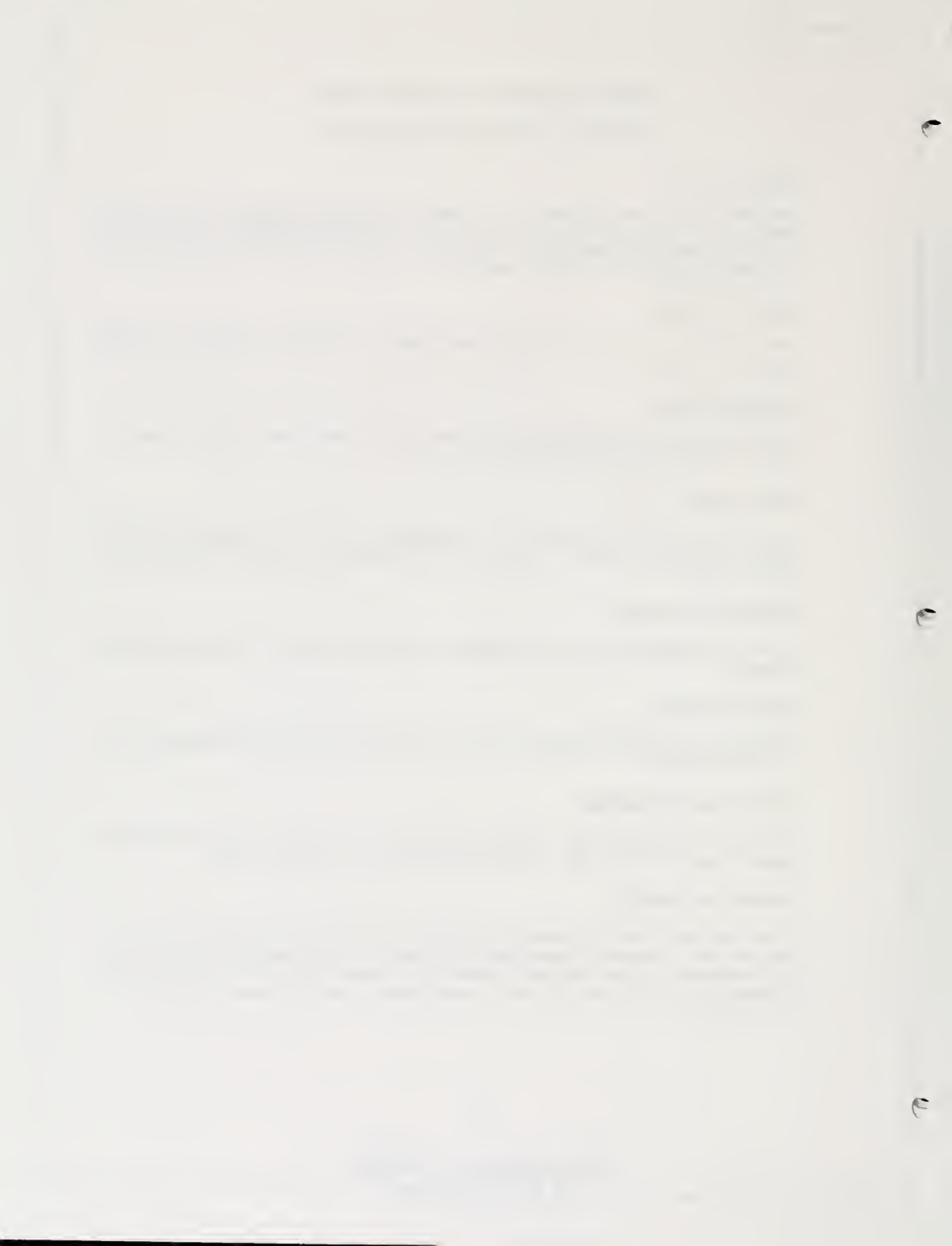
The assets are based on market value, with gains and losses graduated over a 4-year period.

Administrative Expenses

It was assumed that the system would incur no administrative expenses beyond those provided by investment earnings in excess of 8%.

Termination Benefits

It was assumed that all members terminating with less than five years of service would receive an immediate withdrawal of their member contributions with interest. It was further assumed that members with five or more years of service would select the most advantageous benefits under the given assumptions.



Service Purchases

It was assumed that $\frac{1}{3}$ of the members that are within 15 years of service until reaching the assumed retirement age will purchase or buy back 3 years of service. The cost of this service was assumed to equal 20% of the total liability.

Public Employees' Retirement System
Illustration of Actuarial Assumptions

Mortality Rates

Active Members:

The mortality rates are based upon the 1983 Group Annuity Mortality Table setback 1.

Age	Deaths Per 10,000 Male Members	Deaths Per 10,000 Female Members
25	4	2
30	6	3
35	8	4
40	11	6
45	19	9
50	35	15
55	57	23
60	84	38
65	139	64
70	248	109
75	404	211
80	607	385
85	1,060	638

Members Receiving Benefits:

The mortality rates are based upon the 1983 Group Annuity Mortality Table setback 2.

Age	Deaths Per 10,000 Male Members	Deaths Per 10,000 Female Members
25	4	2
30	5	3
35	7	4
40	10	6
45	17	8
50	31	14
55	52	21
60	77	34
65	124	58
70	222	97
75	367	115
80	607	345
85	975	581



Disability Rates

The disability rates are based upon the 1983 Disability Table.

Age	Disabilities Per 10,000 Male Members	Disabilities Per 10,000 Female Members
25	1	1
30	2	3
35	3	5
40	6	9
45	12	15
50	20	22
55	51	41
60	105	87

Withdrawal Rates

The withdrawal rates illustrated below reflect the turnover experienced by the Public Employees' Retirement System.

Age	Disabilities Per 10,000 Male Members	Disabilities Per 10,000 Female Members
25	1855	2423
30	1265	1665
35	833	1096
40	622	854
45	506	695
50	389	538

Salary Scale

The salary increases are based upon an assumed compounded growth rate of 6.25% per annum.

Investment Earnings

Future investment earnings are assumed to be 8% compounded annually.

Asset Valuation

The assets are based on market value, with gains and losses graduated over a 4-year period.



Administrative Expenses

It was assumed that the administrative expenses would be recovered by investment earnings in excess of 8%.

Service Purchases

It was assumed that 1/3 of the members within 15 years of retirement will be purchasing 3 years of service.

Public Employees' Retirement System

Section V

Summary of Benefits and Contributions

Employee Contributions - 6.70% of member's compensation.

Employer Contributions - 6.70% of member's compensation.

Purchase Additional Service - A member may purchase 1 additional year of service credit for every 5 years of membership service. A maximum of 5 years may be purchased.

Cost: A member shall contribute the actuarial cost of the service based upon the most recent actuarial valuation.

Retirement Benefit - Eligibility: Age 60 and 5 years of service, age 65 regardless of service, or 30 years of service regardless of age.

Normal Form: Life payments with a death benefit equal to the balance of member's contributions not received at the date of death.

Benefit: $1/56 \times$ final average salary (FAS) \times years of service.

Early Retirement Benefit - Eligibility: Age 50 and 5 years of service or 25 years of service regardless of age.

Benefit: Actuarial equivalent of the accrued benefit based on retirement at age 60.

Disability Benefit - Eligibility: 5 years of service.

Benefit if hired on or before February 24, 1991: 90% of $1/56$ of the FAS for each year of credited service or a benefit of 25% of the FAS.

Benefit if hired after February 24, 1991: $1/56$ of FAS for each year of credited service.



Death Benefit -

Prior to 5 years of service, return of member contributions plus a lump sum benefit, consisting of one month's salary for each year of service, up to a maximum of six months' salary. After 5 years, the designated beneficiary(ies) is entitled to the actuarial equivalent of the accrued benefit based on the salary, service and age of the member at the time of death.

Termination Benefit -

Prior to 5 years of service, return of member contributions. After 5 years, the member may elect to receive the actuarial equivalent of the accrued benefit based on retirement at age 60.

Benefit Adjustments -

Investment earnings in excess of 8%, if any, are used to provide post-retirement increases.

